SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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HE MUSEUM OF ECONOMIC GEOLOGY, JERMYN-STREET.

That this magnificent and extensive collection of geological and mineological specimens, mining and metallurgic machinery, with their various ocesses, marbles, glass, china, electrotypes, &c., illustrating the economy d purposes of their application to man, should be without a descriptive tologue, or guide, has long been a matter of complaint and regret.

This want cannot again be expressed; we have had the gratification of amining a most elaborate work, containing a concise, yet thorough deiption of every article of interest which it contains. From a preliminy notice by Sir R. Murchison, it appears the authorities were fully are of the deficiency. At his suggestion, Mr. R. Hunt, the Keeper of Mining Records, was induced to undertake the compilation of a work planatory of the various objects, in the easily understood and popular le accomplished by him in his excellent little *Guide to the Great Exhibion*, of 1851. In his introductory remarks, Mr. Hunt gives a complete ough brief history of the causes which almost compelled our Governnt to patronise and popularise these arts and sciences more fully than y had been wont to do,—vote a sum for the support of a proper estashment, and to erect a building suitable for the reception and display examples. In doing so, Mr. Hunt interests his readers, rivets the atition of those engaged in these pursuits, and surprises the novice by the rmous amount of labour required, and the immense national value of se sources of British wealth, industry, and enterprise.

It is generally known this establishment is under the immediate and tinguished patronage of His Royal Highness Prince Albert, a frequent itor to the lectures, &c., and warm advocate of its interests; his preice contributes materially to its success, many of the nobility followy his example. A full account of the ceremony of its inauguration, as ll as the opinions of the various eminent personages connected with its mmencement, are given; and the extensive and beautiful building, strated by two neatly-executed wood engravings is easily examined d understood by their aid.

The first portion of the work is devoted to the various kinds of stone d in constructing the building itself; then to the beautiful marbles, nites, serpentines, &c., used in the ornamentation of the vestibule and at hall, where the various building and other useful stones found in British Islands, are referred to, and fully treated of. The busts of the lebrated professors adorning this part, as well as the branches of science which they severally distinguished themselves, are described. The rearks on the huge coloured map of the Geological Survey is an able disquition; obtuse, indeed, must be the mind that does not appreciate the necesy and value of its construction; although it may have been attended by considerable outlay, yet the amount of ability and perseverance requisite not possibly be overrated. The names of the worthies engaged in this portant task are very properly recorded. The neat and comfortable atre, capable of containing 500 persons, as well as the other buildings, described. The continually augmenting library of the institution eady contains 7000 volumes, on subjects devoted to these sciences. the periodicals relating to them, whether published in England, on Continent, or in America, are regularly received, and are available to students, or the public, under proper and necessary regulations.

The engraved plans referred to distinctly show the cases containing ery object that may be wished to be referred to. The contents are not ly fully and scientifically treated of, but their classical, generic, and chnical names are given, their analysis, locality, produce, and annual lue recorded, thereby giving an amount of statistical, historical, and portant facts never before published. It will be found by the reader at the treatise not only describes the above particulars, but the manipulations of the various metallic ores, and their processes to render them arketable, and enters fully into the methods of smelting them. All particulars of the various earths, clays, sands, and other productions used in e ceramic arts and in glass manufacture, are familiarised, from the crude riginal up to the consumers' hands. This department is most interestngly elucidated by reference to various specimens of Roman, Tuscan, hinese, Majolica, and other celebrated wares, placed in juxta position o those of our own country's and contemporaneous productions, as well n their proportions, construction, and ornamentation; the methods dopted in colouring and manufacturing artificial gems and pearls, and heir component parts are so detailed, they cannot fail to interest. The seful, fashionable, and beautiful art of etching on glass, as well as the ancient and modern modes of enamelling, are explained and illustrated by xamples, as are also the wonderfully executed mosaics.

Foreign as well as British minerals and metallic manufactures, as might ave been expected, receive most ample notice and elucidation. All the arious fossils with which this and other countries abound are classified, d their probable existences, epochs, and habits, speculated on in a most cid manner. The various specimens illustrative of gold, silver, tin, pper, zinc, and other veins or streams, form the subjects of another inructive chapter. In this the recent discoveries in Australia will be und attractive. The chapter on models of crystals and their peculiarie (which ought to be as familiar to every one as household words) will of infinite service in instruction. The description of the cases conining the more delicate and rare specimens of British and foreign metals nd semi-metals, "among which will be found a fine specimen of alumium, and its history," will certainly prove attractive; but in the model om, if we judge aright, will be the spot where this *vade mecum* will be und most essentially necessary. The machine for raising and lowering iners will command respect for its inventor. The elaborate model of olcoath Mine, with the surprising accounts connected therewith, will rprise many; whilst the models illustrating the changes in the rocks d formations of mineral veins and coal measures will familiarise these rvellous phenomena in the world's history. Patterson's desilvering ocess, Davy's safety-lamp, the Cornish steam-engine, various hydraulic d numerous other contrivances used in raising water and dressing the s at various mines in this and other countries, are elaborately explained d familiarised.

The volume concludes with a chapter on the palæontological collection, hich it truly describes as revealing a "wondrous tale" to the practical well as the philosophical geologist.

Having thus far given (the arrangement of this series is stated to be omplete) an outline of the subjects so treated on, it becomes our duty say that no work we have reviewed for many years, whether for eleance of language, clearness of elucidation, or real utility, has so entirely t our approbation. No person but one having Mr. Robert Hunt's exience and opportunities could have executed so great and general a rk in so able a manner. We feel assured the public will agree with when we say that Sir R. Murchison was a good judge in recommend- Mr. Hunt to undertake a task he has completed in so satisfactory a nner, redounding, as it undoubtedly will, to Mr. Hunt's already acired fame as an author.

GOVERNMENT SCHOOL OF MINES.

The concluding lectures by Mr. Warington Smyth on mineralogy treated of the "Ores of Copper, Cinnibar, Silver, Gold, Platinum, Osmium, Iridium, and Palladium." Native copper: this contains about 99·8 per cent. of pure copper, and is found in several localities. Of late years the district of Lake Superior, in the United States, has been celebrated for the large quantities which it has produced; in Cornwall there are several places where it is found, and amongst them may be noticed Wheal Buller and the Consolidated Mines. Red oxide of copper: this is a valuable ore; it is of various shades of red, and by transmitted light sometimes crimson red. Before the blowpipe it is reducible on charcoal, and with borax fuses into a fine sea-green glass. Malachite, or green carbonate of copper: large and beautiful specimens of this have been obtained from the famous Burra-Burra Mines in South Australia. This contains about 72 per cent. of copper, and is easily reducible. Blue carbonate of copper: the best specimens of this beautiful mineral were formerly found at the mines worked at Chessy, in the neighbourhood of Lyons; it crystallises in a variety of forms, sometimes occurring massive, and at others columnar or tabular. It generally contained 3 equivalents of copper to 2 of carbonic acid. Black oxide of copper is of brownish-black or black colour; it occurs in most of the Cornish mines, and has likewise been observed at Chessy, in Peru and Siberia, though in small quantities. The most remarkable deposits of malachite are those in the Ural Mountains, where it is found in such large slabs that it can be used for ornamental purposes. They could all remember the products of that mineral which were sent from Russia to the Great Exhibition of 1851. Another locality is the Burra Burra Mine, and it is sometimes met with in the Bannat, but is of rare occurrence in England. The blue carbonate sometimes accompanies the other; a series of pseudomorphous changes are, however, going on, which shows how careful painters ought to be in their colours, as sometimes very curious variations occur in frescos. The painter may have laid on a sky-blue colour, and this, by a psuedomorphous action, has become a green. Chrysocolla is a mineral very similar to malachite, but contains a considerable proportion of silica and water —it is a very rare mineral. Two splendid specimens of this were exhibited—the one from the Phœnix Mines, the other from Cosheen. Dioptase: this crystallises in six-sided prisms; it has a most beautiful appearance, similar to that of the emerald. Its hardness is 5. Linarite, a cupreous sulphate of copper, has a fine lustre, almost adamantine, and translucent. This is only met with, in large quantities, at Linares in Spain, and Lead Hills in Scotland, in some cases where a decomposition of this mineral has taken place, it has been found that the burrows which have been abandoned would repay the cost of again being picked. Copper glance, vitreous grey copper, or redruthite: this mineral has received its designation from the district of Redruth, where it is obtained in considerable quantities. Hardness from 2·5 to 3. Externally it is of a black colour to a lead-grey and is one of the most valuable ores for sulphur, and contains from 75 to 80 per cent. of copper. It is found near Redruth, Camborne, at Botallack Mines, near the Land's End, at the St. Ive's Consols, and the Levant Mines; in Hungary in not many localities; in Germany, in Tuscany, and likewise at the Knockmahon Mines, in the county of Waterford. Copper pyrites: this is the most abundant variety of copper. A fine specimen of this, from Herodsfoot Mine was exhibited and described. Many parties were apt to confound this mineral with iron pyrites, from which it totally differed. Its hardness is from 3½ to 4. In its pure state it contains about 34 per cent. of copper. It is sometimes found cropping out at the surface, but more generally at depth. Sometimes it is called peacock ore, from the varities of colours it assumes; but this is not to be confounded with the buntkupfererz or purple. This occurs in the cubical form; the fracture is uneven, and the hardness 3. People who see stones of this ore at surface are often led to prosecute mines, in the hope that the ore will be of the same richness, and as this is very seldom so it frequently leads to great disappointment. It has lately been found in considerable quantities at the mines of Monte Catini, in Tuscany. Grey copper, or Fahlerz, tetrahedral copper glance, sometimes called grey copper ore, though this is not a proper name for it; besides a large percentage of copper, it generally contains a considerable quantity of silver, sometimes as much as 20 per cent. Mercury is occasionally one of its constituents, and 13 per cent. of that valumineral has been found. It is not common in great Britain, though it ought to be looked after. Some fine specimens of it have been obtained from the Crinnis Mines, near St. Austell. Atacamite, or muriate of copper, crystallises in the rhombic prismatical form, is found at Remolinos, in Chili, and in the Atacama Desert in Peru, from whence it derives its name; it likewise occurs in the iron mines of Schwartzenberg, in Saxony, and on the lavas of Mount Vesuvius, where it is formed by the union of muriatic acid, and carbonate of copper. Before the blowpipe it gives the flame a bright blue or green tint. Condurite, which is found at Carn Brea, is supposed to be an arseniate of copper. Olivenite is a combination of arsenic acid and oxide of copper; its colour is from olive to blackish green. Some thirty or forty years since, considerable quantities of this mineral used to be raised from the mines in the vicinity of Redruth; some beautiful specimens have been obtained Tincroft. Copper mica, sometimes called calcophilite: hardness from 1 to 1½; its primary form is a right rhombic prism; is found in cavities of calamine, associated with barytes, calcareous spar, or quartz, in Siberia, the Tyrol, Libethen in Hungary, and Matlock in Derbyshire.

Mercury: this occurs in the native state in but few localities, and only in small quantities, generally in the form of globules disseminated through the matrix of the stone. Native amalgam crystallises in the cubical form; hardness from 3 to 3½; specific gravity 14; it is found principally at Rosenau in Hungary, and Moschellandsberg at Zweibrucken. Cinnibar, or sulphuret of mercury, crystallises in the rhombohedral form. Considerable quantities of this are raised at Almaden, at Idria, and in the Alps of Carinthia. At Almaden it is found in large veins, but at Idria only in small deposits; with regard to these last there is a report which has long been current, and generally believed, but which has no foundation in truth, that the persons working in the quicksilver mines there are political prisoners; but this is not the fact, as the miners there are as free to come and go as they would be in any other employment. Great care is taken of the ventilation, and when from the decomposition of the mineral it is likely to become detrimental to the health of the men, they are immediately removed, and that they are not allowed to work for any considerable period in a close end. This mineral soon tarnishes on exposure to the atmosphere. Several varieties were then exhibited and described. It has been found in Ripa in Tuscany, and some quantities have been obtained from Rosenau; of late years it has been discovered in California, and the Chinese possess mines of it. Its other localities are Peru, Mexico, Chili, and Kremnitz in Upper Hungary, where it permeates many portions of the upper part of the vein. The same phenomenon has been observed at Felsobaya, where it colours crystals of barytes, and in Bohemia, where it performs a similar part with quartz. Hepatite cinnibar, or liver ore: occasionally, from its colour, it is denominated brick ore. A number of these ores have to pass through various mechanical processes before they can be rendered available for commercial purposes.

Silver: it was of great importance when ores of this metal and mercury occurred together. Several ores of this kind, owing to their not being known, had often been wasted and thrown away. Native silver crystallises in the cubical form; its most remarkable crystals are found at Kongsberg in Norway. That which is obtained from this locality contains also a proportion of mercury and antimony. Native silver was often found drawn out in very fine capillary forms. Some specimens from Kongsberg were exhibited and their crystallography illustrated by diagrams and models. Sometimes they were so tarnished that they assumed a red colour and could often be taken for native copper. It was met with in other minerals, such as zinc blende, iron pyrites, quartz, and felspar, but rarely with selenite. Chloride, or horn silver: its primary form is the cube; it is generally found in incrustations, and so soft that it can be scratched with the nail. Its hue is greyish, or greenish, and is so easily to be reduced that it is fusible in the flame of a candle. Its specific gravity is from 4¾ to 5½. It is found in two or three mines in England, in the vicinity of Callington, as well as in the Channel Islands, at the Isle of Sark. Bromide of silver contains about 80 per cent. of the precious metal. Silver glance is of a dark lead grey colour, with occasionally a superficial iridescent tarnish; it generally crystallises in the cubical form, assuming also various reticulated, arborescent, and filiform shapes, and often contains as much as 87 per cent. of silver; it is found in the mines near Callington, has been met with at Dolcoath, in Freiberg, in various parts of Hungary, and in several provinces of South America; its greatest locality, however, is Mexico, most of the silver obtained from the mines of Guanaxuato being extracted from this ore. Stephanite is another variety, so called from the Archduke Stephan, formerly Palatine of Hungary; its hardness is 2½, and its specific gravity 6; it is found in South America, Hungary, and Freiberg. Polybasite is a rare substance, of an iron black colour, with a streak of the same hue, and met with at Guarisamay, in Mexico; it occurs in a rhomboidal form, in tabular shaped six-sided prisms. Red, or ruby silver (rothgultigerz), is sometimes found of a dark, and at others of a light reddish tint; its crystals are sometimes very complex. It is met with in Hungary, Freiburg, South America, Kongsberg, in Norway, Guadalcanal, in Spain, and at St. Marieaux Mines, in France, occasionally in dendritic forms. The two varieties differ in specific gravity, the light being about 5·6, and the dark 5·9. From the value of silver, it will be seen that a very small percentage will pay for extraction; much must, however, depend upon the locality, the cost of transport, and the expense of reduction.

Gold is found native sometimes in combination with tellurium. In the eastern part of Hungary it is largely worked, and in the matrix in which it is contained not a particle of the precious metal is to be seen; it crystallises in the cubical system, and a number of small forms. The crystals from Siberia are in aggregated masses, and sometimes so exaggerated that they appear like those of native copper and silver. In Transylvania, it occurs in thin plates, and is commonly found in small grains disseminated through the stone, or in minute scales, as in stream gold; occasionally as pebbles, or in what are denominated nuggets; its hardness is from 2½ to 3, and its specific gravity from 17 to 19⅓. Its colour, gold yellow, brass yellow, or nearly approaching to silver; in all cases it contains more or less of that metal—in some instances only from 1 to 2 per cent, in others 40 per cent. An analysis from Hungary, by Rose, gave gold, 84·89; silver, 14·68; copper, 0·04; iron, 0·13. From California, by Henry, gold, 86·57; silver, 12·53; copper, 0·29; iron, 0·54. The gold from Australia was finer than that from California. They were all aware that there was something seductive about a gold mine, and people generally rushed to explore it. In most cases, this was a great delusion, as there were many minerals, the prosecution of which repaid the labour bestowed upon them much better. The greatest quantities of gold that had been produced had not been from mines, but the beds on the shelf of the rock; a diagram of this was shown and described. The diggers in one hole would be very fortunate, whereas those who were a few yards separated from them might be quite the reverse. Those who were acquainted with stream works knew the method of selecting them, and a great deal depended upon this knowledge; it was requisite they should be acquainted with the nature of the gravel, and where the gold was likely to be met with. It would always appear to have travelled some distance, as it was invariably rounded, and it was no uncommon instance that after a stream works had been exhausted, a few years later a second party would go there, and meet with fortunate results by again re-washing the gravel, some of the streamers being of opinion that the gold grew. The fallacy of this erroneous idea it was not necessary for him to dilate upon. The subject of gold in quartz veins was a question of great delicacy, both in California and Australia. They had heard much about gold in England; a specimen which he had was from Dolgelly, in North Wales. This was exhibited. They would observe that this was very rich; he would not say that this would be continuous, but he thought that where so much was found it was worthy of a trial. A great cause of the failures that had arisen in California had probably been derived from the fact that, although in some portions of the vein gold had been found, yet they might go on fathoms and not find a single particle. In the Alps of Salsberg, and in Hungary and Transylvania, the ores contained both gold and silver. At Schemnitz, when the quartz had an amethystine tint, it was generally considered more favourable for gold. At Vorospatak, it is curious that the gold occurs in conglomerates. In Hungary, a very small quantity pays; in several of the mines, they consider that, out of 50 tons, which was equal to 1000 cwts., if 4 ozs. were obtained it would make a profit. In North America, the ores are in general rich, but occur in small quantities. It was a great question, where gold was only associated with quartz, whether it would ever pay, unless mixed with some other mineral. It was met with brown iron ore in Siberia, and with jacotinga (a sort of micaceous iron ore) in the mines of the Imperial Brazilian and St. John del Rey Companies. It is likewise found with iron pyrites, galena, and zinc blende. Gold has been discovered in other numerous localities, in every country of the worl, whether civilised or not, in the Rhine, the Rhone, and the Danube; in the latter river for a long period by the gypsies, who have settlements on the border of that stream. It is only about 30 years since it has been explored in the Ural Mountains. The discoveries of California and Australia were fresh in their memories, and needed no further allusion here.

Platinum is found only in a few localities where gold is met with. It crystallises in the cubical form, and is in grains or pebbles, its hardness is from 4 to 5, and its specific gravity 17 to 19; it is generally associated with iron. Its principal localities are in the eastern parts of the Ural Mountains and South America. It has lately been discovered in New Granada. At a very recent date, attention has been called to its discovery in the French Alps, in the Fahlerz. In the Ural Mountains it is in the serpentinous rocks, and the same may be noticed in Borneo.

Palladium is always found associated with platinum; its specific gravity is 12. Iridium is met with in grains in Siberia; its hardness is from 6 to 7, and specific gravity 22·7; Breithaupt, however, states it is 23. The colour manufactured from it is valuable in porcelain painting. Osmium has a specific gravity of 19·4. The alloy of iridium and osmium, commonly called iridosmine, is employed for the purpose of manufacturing gold pens, the nibs of them not being liable to corrode, and being much more durable than those of steel or any other metal.

Mr. Warington Smyth concluded by observing that the students would not always have the opportunity of studying from a museum; they must go and collate from nature, first of all ascertaining the characteristics of the simplest substances, as they found them in the rocks, and thence, by study and investigation, following in the higher paths of the science. Mineralogy was always a great assistance to the miner, and a knowledge of the peculiar minerals would often be found an indication as to where several of the metallic ores were likely to be met with. A careful perusal of the different works on that subject he would recommend, but above all things he would advise that they should endeavour to obtain a practical knowledge, and this they could attain only by long and diligent research.—This terminated the course of lectures of the session of 1856-57.

BRISTOL SCHOOL OF MINES.

The lecture on Monday was given by Mr. T. Austin, on "Pumps and Pumping." The lecturer remarked that (120 B.C.) Ctesbos was said to have invented pumps at Alexandria, thus pointing to a remote age for the discovery of one of the important principles of hydrodynamics. There were numerous machines used for the purpose of raising water from one level to another. If we confined the meaning of the term pumps to such modifications of machinery as were by common acceptance deemed contrivances for raising fluids by atmospheric pressure, we reduced their number to three varieties—viz., the suction pump, the lifting pump, and the forcing pump. Taking the simplest and, as we might infer from the peculiar circumstances under which they were used, the most ancient form, the Persian wheel might first be described. Upright buckets were attached to the rim of a wheel moving through a reservoir of water, being filled at the bottom and emptied at the top; thus the water was raised nearly the diameter of the wheel. These wheels were turned by animal power, and not unfrequently by manual labour, and were of the utmost importance in Persian agriculture, inasmuch as no arable culture could be carried on in Persia without artificial watering. An improvement on the Persian wheel has been successfully introduced at Blair Drumma, where it was used to wash away the light spongy peat for the purpose of exposing the rich alluvial soil beneath; the improvement consisted in placing floats on the exterior of the wheel, these floats were acted on by the water of a stream on which the wheel was erected, causing it to make nearly four revolutions per minute. Buckets similar to the Persian ones were introduced in two sets, and arranged so as to receive water each side of the wheel at the base, and to discharge it when near the upper part of its gyrations into a trough. By this means a wheel 20 ft. diameter and 10 ft. broad was capable of raising 60 hogsheads 17 ft. high per minute; this maximum was not attempted as the pipes for conveying the water were inadequate to carry off such a quantity, 40 hogheads per minute being the rate at which the machinery was driven. The water thus raised was conveyed by hooped pipes and by an open aqueduct a distance of one mile from where it was raised. Next in simplicity to these were the chain pumps: the diagram exhibited showed a good example: there were other forms but only modifications of the same principle. The chain consisted of long links of metal rods with a bucket or flat disc attached to the centre of each link; these discs fitted the pump barrel with tolerable accuracy, and revolved like an endless rope over two wheels, one over the mouth of the discharge pipe, and the second to be immersed in the fluid to be raised. These wheels were provided with projectors or arms which supported and kept the discs in their proper position, and in consequence of turning readily upon their axles presented little impediment to the series of buckets passing rapidly up the pump. By having a winch attached to the upper wheel, the whole chain with the bottom wheel was set in motion, and the more rapidly this was effected the less leakage occurred. This species of pump could not be used in completely draining any cavity, it being obvious that there must always be water enough to cover the lower wheel. The chain pump used on shipboard was properly speaking a bucket engine, differing from the above in having the discs furnished with sides forming them into buckets, and the barrel or trunk being omitted, these forms of pumps were not liable to choke from accident, and being without the leathers forming the valves of ordinary pumps, dry weather cannot render them inoperative. Rope pumps were a Chinese invention, they consist of a rope of hemp or wool, or thongs of skin very loosely twisted together, and then passed over two rollers, one immersed in the liquid and the other at the height to which it was necessary to raise the fluid, and this rope being an endless one, a rotary motion being given to the upper roller, the whole was set in motion, and the more rapidly this was done the greater the quantity discharged. In this case the buckets were the cavities formed by the loose texture of the rope, and the cause of it discharging the fluid at the upper wheel was its pressure on that part, and a certain amount of centrifugal motion. Mr. Austin proceeded to notice the Archimedian screw, the hydraulic ram, the lifting, suction, and force pumps, and the modes of applying them.

*** Four volumes of the Transactions of the North of England Institute of Mining Engineers are now published, and contain a large number of highly valuable Papers by eminent scientific men. The volumes may be had, together or separate, at the Mining Journal office, price 21s. per volume; or by order of any bookseller.

CORNISH MINE PHOTOGRAPHS—No. III.

BY GEORGE HENWOOD.

THE ENGINE OPENING DAY.

"Are you aware that you are invited to a ceremonial dinner to-morrow?" enquired one of our tourists, as he handed an open letter to his friend on making his appearance at a late breakfast at mine host's of the White Hart, after a hard day's scramble and ramble among the mines and cliffs in the neighbourhood. "Indeed I was not," replied he, after reading it: "the invitation is very brief, truly, but it is given with so much genuine Cornish cordiality and welcome, and on so interesting an occasion, that refusal is out of the question." As we were favoured with a sight of the letter, we found it was an invitation to dine at the Great Wheal C—— Consols Mines, where on that day they were about to set to work for the first time a very large and splendid engine, by one of the most celebrated engineers in the county. It was intimated that their company would be expected, and no excuses taken; that some of the principal proprietors would be at the White Hart by early morn to meet Capt. D., the manager, Mr. G., the purser, and other officials of the mine, where they would all partake of a *dejeuner à la fourchette*, by way of a beginning, and immediately proceed with the engineer and contractor to the mine, which lay some seven or eight miles from St. A——, near the rustic village of N——.

Whilst penning an acceptance of the polite invite, the door of the apartment was opened by Mr. G., the purser, who had been before introduced to them. He frankly and unceremoniously began by giving details of their projected proceedings, and without giving time for apology, question, or reply, went on saying, "Now, be sure and be ready early. We expect Sir John D. will take the chair, the lord of the manor, the parson, two or three magistrates, and several others will attend. But I must be sharp, and secure conveyances." After musing for a minute, he concluded by saying—"By Jove! we must have four carriages, at least; one of you can ride with me, and one with the doctor, as before." Ere we could well understand what he alluded to, or consider our situations, he was off to make his arrangements, and seemed as much concerned as if he were preparing for a lord mayor's banquet. His greatest anxiety, however, appeared to be whether the reporter of the *Mining Journal* would be present. "It will be well worth their while if he is," said he, proudly; "as we shall all of us order a few copies for ourselves, and to send to our friends; the landlord says he will give him bed, board, and conveyance." We were emphatically exhorted not to do too much at it to-day, as to-morrow would be a "stunner."

At the White Hart all hands were alert by four o'clock in the morning. The post and stable boys joked merrily, and groomed their steeds with glee, the prospect of the coming stir enlivening even them. The ostler touched his forelock, as he took the horses of the captain and others who had arrived to welcome the gentlemen from "up the country." The old waiter bestirred himself, as well as he was able; the pretty waitresses, and spruce chambermaids bustled and hurried to and fro in their smartest attire; there was "such a getting up stairs," as evidently bespoke a great occasion was about to take place. Mine host and hostess were superintending the "laying out" the breakfast in the long ball-room, and had only just completed their duties, when the sound of a horn heralded the approach of the "gents," who drove up to the door of the hotel in noble style. After due congratulations on the part of the captains and persons present, our tourists were formally introduced. Sundry baskets, from which protruded the legs of animals and tails of birds, and cases marked with foreign brands and cyphers, were handed down, from, and out of, the vehicles, and Mr. Boots, with a knowing leer of the eye, enquired were they to go up stairs too? on being told they were to go to the mine, the smile on his face said, as plainly as if he spoke, "I wish I was also."

Ample justice having been done to the really handsomely served repast (the captain had advised all present to take in a good tamping to begin with), the party entered fresh carriages, not forgetting the mysterious-looking boxes and baskets (the contents of which Master Boots vowed 100 to 1 he could name). The carriages forming the van, the rear was brought up by the strangers and their companions; the reporter, who had arrived, and the host, being the last, in an appropriate dog-cart. A merry party were they that day when they started off at a smart pace for the village of N——. Cigars, of course, having been lighted, on they went through a cloud of smoke and dust; many a joke and gibe were bandied from friend to friend, many a kind hope expressed that they in the rear might get to their journey's end before "half play;" and many a kind offer to assist if they would throw a rope to them. And so they joked and journied until the merry church bells and sounds of music announced their approach to N——, at the entrance of which a "band" of five musicians headed the procession to the Cornish Arms, playing as lustily as they could blow and strike, "See the conquering hero comes," the tail of the procession being made up of all the idlers, men, women, and children, the neighbourhood could furnish. Here again, as a matter of course, it was necessary to "wet the whistle," "wash down the dust," "cool the coppers," &c., and sherry, bitter beer, bottled stout, and other such refreshers, were in considerable requisition.

The cavalcade now slowly approached the scene of action, the mine,—we say slowly, for the very sufficient reason the roads were in such a state of repair mine host expressed considerable anxiety for the safety of his steeds and springs, the gents for their necks, and the captain for the basket of champagne he was determined to "stand" himself on this great event. The musicians were delighted, as it gave them ample opportunity to display their talents, which, if not equal to Jullien's celebrated performances, were quite as meritorious, every one doing his utmost to please.

At length, after many "hair-breadth 'scapes," they all arrived safely at the mine, where they were received by the lord of the manor on which the mine is situated, the clergyman of the parish, the magistrates, and other invited guests, with three loud hurrahs, aided by the powerful lungs of some scores of miners, who appeared to come out of all sorts of places, in every variety of costume, as if by magic. The gents having been duly shown into the new large counting-house, which had been decked with laurel for the occasion, and having been introduced to the local celebrities, were compelled, *nolens volens*, by the managers to toast the Great Wheal C—— Consols in a bumper of champagne. The mine at surface and machinery having been examined and explained by the captain and engineer, they go to view the noble boilers, and to ascertain if the steam was up (it certainly was with some of the party, in more senses than one). The engine-man, as a matter of course, nearly frightened one half the company, by turning the trial cock on at full power to prove the steam there, at all events, was up. The engineer stepped forward, begged to know what the name of the engine was to be, and who the godfather. The lord of the manor requested it should be named after the Chairman of the company, and he would himself become the sponsor. "Then please gentlemen, to stand here, and when she makes the first stroke, throw this bottle of port wine at her, christen her, and wish her success." The engineer then disappeared, but in a few seconds a hissing sound and gurgling noise was heard, and a few exclamations of—"Now, then, my brave boys!" and the ponderous beam, more than 25 tons, moved up and down, the christening ceremony was performed, the company and miners cheered lustily, the "band" rolled their noisiest sounds, and, before the day was over, the triumph of man's ingenuity moved "like a thing of life." The now proud captain, and still more proud engineer, were complimented by the Chairman, and retired to swagger a little at the day's success. The Chairman and strangers accepted an invitation to visit the mansion house, and be introduced to the ladies, and view the grounds, gardens, and pictures, until the mine bell announced "in a quarter of an hour dinner on the table," when all returned, and found a substantial repast of old English fare, with bread and vegetables provided by the mine adventurers; to which was added a second course, admirably cooked at the mansion-house. This course, together with the wines, produced in ample quantity, had been the contents of the mysterious boxes and hampers before mentioned. A splendid dessert, from the gardens of the mansion, completed a dinner that would have cast no disgrace on the most accomplished *restaurateur*. The ponderous joints being removed to impromptu tables laid in the carpenter's shop and saw house, soon disappeared before the efforts of a combined attack from the miners, drivers, and band, leaving scarcely a wreck behind. Poor fellows! they appeared to, and no doubt did, enjoy their treat, equally as well as their superiors. They amused themselves over their beer and cider (provided *ad libitum* by the proprietors), if not quite so rationally as the gentlemen, they did quite as noisily: much to their honour, not a single instance of inebriety or misconduct had to be complained of.

In the count-house the Chairman of the company, as a matter of course, was lord of the feast; on his right sat the vicar, on the left the captain, the "vice" devolved on the lord of the manor, supported by the engineer and purser of the mine. After the usual loyal and patriotic toasts were disposed of, the Chairman said he had now come to the business of the day; he expressed his delight at their proceedings, the whole of which he approved, dilated extensively on the abilities of the engineer, as that day exemplified; on the captain's integrity; on his own confidence in the mine; on the pleasure he felt at the presence of the worthy vicar, and so many of the surrounding gentry; but more particularly of that of their excellent vice, whose liberality all had that day witnessed and partaken of, and whose good health, long life, and prosperity, he earnestly desired, and concluded by calling on him for a song.

The worthy squire, desirous of being all things to all men, good humouredly complied, and in a brief speech assured them all he had and would do his duty to the mine as long as the company did theirs. (Cheers.) If the mine would not pay he would not require dues. (Cheers.) No, not he! he would not distress any company, or rob any individual; he had not as yet become a shareholder, but as he was fully convinced they were a company who would work the mine in a miner-like manner he could not refrain from joining the adventure, therefore he desired Mr. G., the purser, to enter his name in the cost-book for 100 shares. (Repeated cheers.) He sat down after proposing long life to the noble Chairman of the Great Wheal C—— Consols Mines, and may he meet them at no distand period to declare dividends; he should return the singing compliment, as he felt assured so smiling a countenance as the noble Chairman possessed would most certainly follow example. The noble chair replied satisfactorily and briefly.

Everybody having toasted everybody, and everybody having sung, everybody seemed satisfied; the reporter was warned to give a full account of the day's proceedings in the Journal, hence this lengthened notice. The procession returned in the same order it came, save a little more uproarious glee, to the village, when the same motley assemblage were in attendance to welcome them; instead of bitter beer, "Hot within and cold without" were substituted, the party arrived at St. A—— in time to find the hostess red-hot with rage, to think her beautiful supper had been spoiled by waiting. No matter; this was dispatched, green tea and good coffee being in demand; the party retired at an "early hour," (?) to dream of an engine opening day.

N.B.—Report says there was a "St. Aubyn's day," but as it is the reporter's province to chronicle nothing but facts that come under his immediate attention, no notice can be taken of it—indeed, had we witnessed it a veil would have been thrown over it, "circumstances considered."

MEMS. OF MINES AND MINERS.—No. VIII.

In our last it was stated that the object of these papers is to show to what kind of persons these vast interests are entrusted. We have depicted the characters and qualifications of a great many who have been celebrated in one department or other of mining science: we resume our series by referring to some eminent living miners.

Capt. JOSEPH LYLE, a name as well known in London as in Camborne, is one of those Cornishmen whose indomitable zeal, perseverance, and confidence, no disappointment can dismay or misfortune crush. Capt. Lyle, in early life worked as a practical miner, and gained his captaincy by the sweat of his brow. In after life he experienced the same vicissitudes, sometimes (like the lodes he worked on) rich, at other times not so. The school underground had taught him never to despair, that perseverance in mining is certain ultimately to be rewarded. With this conviction firmly settled in his mind as a principle, he overcame difficulties that to many would have appeared overwhelming. If one speculation did not equal his expectations he, nothing daunted, boldly tried another; this he did on several occasions, with chequered success, until Fortune from Carn Brea Hill (where he long and perseveringly had sought the fickle Goddess) smiled on her votary, and rewarded him to his heart's content. Two or three mines, in which he had adventured until he was in absolute difficulties, suddenly made such important discoveries as enabled Captain Lyle to take a prominent position in mining matters. He purchased the splendid estate and mansion of Bonython, near Helston, where he spends his *otium cum dignitate* in attending to his farm—which is a model to the neighbourhood—and in the enjoyment of his friends and acquaintances. Nothing gives him greater pleasure than to meet any of his quondam associates to talk over old times, and encourage them to persevere as he has done, when they will be eventually rewarded, as he has been. This worthy owes all his fortune entirely to the qualities before-mentioned, and not to lucky purchases or wild speculation.

Captain WILLIAM RICHARDS (Redruth).—There are so many Captain Richards's, and withal William Richards's, that when speaking of Capt. Richards it is as necessary to particularise him distinctly as to direct to a person in King or Queen-street, London. Therefore, we say "Captain Will," as he is familiarly called, of the West Basset, Redruth (a letter so directed would find the object of our notice), is one of the Cornish worthies who has been rewarded by an ample fortune for his industry in his profession, his perseverance as an adventurer, and his independence as an agent. As a practical working miner, few men have had more experience, nor has that experience been confined to one locality; that judgment so formed has been earnestly sought for as advice in almost all parts of the British Islands. Few men have enjoyed so many well paid inspections, and even now, at his advanced age (upwards of 70 years), the fruits of vigorous exertion in youth are apparent; it is surprising to see with what activity a man of his years, and so stout withal, can climb the ladders—aye, in a style, too, that would put many a young man to the blush. The writer of these papers was underground with the captain not very long since, and really felt as if the natural atmosphere of the captain was underground; there he seemed at home, and in his element. At a time of life when most persons retire from their professions, if they have the means, Captain Richards is as active as a boy, and enjoys a virid old age. Perhaps he may say, "I am not old." God grant he may never feel so, if he lives to be 100 years. It is a glorious sight to see the old gentleman take his position at the head of the table at West Basset, on sampling day, when he does the honours in a style not to be surpassed. Capt. Richards has the superior management of some of the best mines in Cornwall, and has held them for many years, a fact above all encomium; he is also an adventurer in some of the best mines near his native place, where he lives respected by his friends, adored by his relatives (a happy little circle), and looked up to by the miners as a father and a friend.

Capt. WILLIAM MARTIN, formerly of Tresavean, is another of those persons whose motto is, "Confidence in the theory and true practice of mining must ultimately lead to prosperity." This worthy was one of the band, he may be said to have been the leader of the band, who, at the meeting to determine whether Tresavean should be abandoned or not, inspired Capt. Teague, Mr. B. Sampson, and others (himself holding a large share), to go on, let who would throw up their interest. He saw from appearances it was impossible but that the lode must make ore somewhere; the beautiful stones of crystallised grey, native, and ruby copper that were occasionally found (many of which the author saw at the time) could not but have some basis. Perseverance soon found that main spring from which one of the richest mines the world ever saw was developed, having returned in 15 years upwards of 450,000*l.*, exclusive of 55,000*l.* paid as dues to the lords of the manor, an amount that, as may be supposed, enriched all concerned, there being only 96 shares in the mine; the value to which they attained seems fabulous. Capt. Martin, independently of his good fortune, is celebrated for his liberality and kindness; the writer of this paper once witnessed a remarkable instance of generosity, at the Fox and Hounds, in the village of Comfort, near the mine, that, young as he was, he never forgot. The neighbourhood is replete with tales of Capt. Billy's goodness. Capt. Martin's abilities as a miner are best displayed by his works, ample evidence of which is afforded to any person who visits the Tresavean; though now shorn of its splendour, it is a great mine yet. It is rumoured that Capt. Martin intends to prosecute a new adventure. If so, God speed him as before: his ability no man doubts; his integrity no one ever questioned.

Capt. JOSIAH HITCHINS (Tavistock).—*Palmam qui meruit ferat.* To have been the discoverer, "as was the fact," of the Devon Great Consols, is enough to give any name a world-wide celebrity. So it was with the name at the head of this article; to him is justly due the merit. Other parties, it is true, had opened on the lode, and made a discovery, which they worked for some time on gossan—nothing but gossan. The eye of Capt. Hitchins soon detected that the gossan was but the back of a vast lodo: he, therefore, advised his friends to do as he did—take a goodly interest, and sink a few fathoms; for surely, said he to himself (I have since heard him say that was his feeling), this splendid gossan cannot be here for nothing. It must either be a cause or result of some great natural effort, and what that effort is we will try, and try they did; to what purpose the world does not yet know, but they do know that the Devon Great Consols are now dividing the second half million of pounds profit. Mr. Hitchins was, of course, an exceedingly wealthy man; his opinion was deemed an oracle; men of all classes, grades, and professions, sought him, and to have the name of Hitchins associated with a scheme was in itself a guarantee to success. Not so, however: Mr. Hitchins, like many others, trusted too much to circumstances, and the glittering prize partially left him, though he still retains a goodly interest. Capt. Hitchins now stands at the head of his profession as a mining engineer and mine inspector; his great experience in Devon, Cornwall, Wales, Ireland, and on the Continent, together with a most liberal education and scientific attainments, justly entitle him to the highest distinction as a judge of mining properties, or of strata for the purposes of mining. Mr. Hitchins displayed in his great discovery a profound judgment on these important elements of a mine; his minor discoveries and condemnations warrant this opinion. It is said Mr. Hitchins is about working a mine in Ireland, and one in Cornwall. If so, we truly say for ourselves, as we may for all the miners in Devonshire, where Mr. Hitchins is idolised, "Go on and prosper."

ROCKS AND MINERAL DEPOSITS OF NAMAQUALAND.—No. VIII.

I mentioned previously that the rocks of Southern Namaqualand are of a pre-eminently granitic nature. The Table Mountain sandstone of Southern Namaqualand bears, in its nature and structure, most resemblance to the Table Mountain sandstone of the southern part of the colony. Within the basins,* or rather, more or less, basin-like depressions, of the general surface-shape of the country, which contain, and, perhaps, have been (directly and indirectly) formed by, the larger rivers (or, rather, river beds) and their tributary valleys and ravines, that Table Mountain sandstone appears to be of rarer occurrence, only traces, thin remnants of it being found lining the base, or foot, of granitic ridges and mountains; the same rock, however, is frequently noticed towering on one or more sides of such localities; and wherever we find, when standing on a lower level, the same rock lining, in abrupt, almost perpendicular, masses, one side of the respective basin, we may safely take that side as the one which leads to a plateau, or, at least, higher steppe, of the country (which is the case near the Buffalo and Schaap Rivers). The various positions of the Table Mountain sandstone in various localities present many singular and interesting features: here we find it capping the tops of high mountain ranges; there we find it gradually descending, sliding down, as it were, towards a lower level, lining the sides, and often altogether covering the bottom of valleys; often, especially on higher plateaus, forming a thin crust, in the fissures of which the granitic base rock is often exposed to view. The greatest number of boulders and rubbish occurring invariably there where this rock is most deviating from its original (horizontal) position, sufficiently indicate the probable causes of such variations,—wear and denudation, and all the agencies accompanying the same; which were, perhaps, the prime agent in the excavation of such basins, and their valleys and ravines; and a careful study of the appearance of the Table Mountain sandstone in various localities, would afford a good criterion by which to judge and explain the formation of such basins, valleys, &c., and would, at the same time, afford an index to the peculiarities in structure and position of various surrounding rocks.

Gneiss, in various stages of development, forms the principal rock of the surface of many such basins; it changes so gradually and imperceptibly into granite, laterally as well as downwards, that it is impossible to draw a distinct boundary line between the two. It is said that gneiss is an ancient sedimentary rock: but even supposing the probability of the mineral matter essential for forming such deposits, and which must have been suspended in the water previously, being the produce of a condensation of certain gases,—what was the base rock upon which that sediment was deposited? It must naturally have been a solid rock, and a rock of no high temperature either; for, by admitting the former rock (gneiss) to be the result of sediment, we must admit that the waters of that supposed period must have been in such a condition as to admit of the formation of such a sediment. They must have been in a quiet, calm state, such as is incompatible with the supposed heat underneath; for the formation of mineral crusts in steam-boilers cannot by any stretch of imagination be taken as illustrative of the formation of such rocks on our earth, the conditions in both being so totally different from one another. The most simple and natural, and probably the most correct, theory appears to be that which takes gneiss as the produce of an exfoliating development of the exposed portions of granitic rock, which theory I think was first propounded by Mr. Hopkins.

On careful examination of the granitic rock when in contact with gneiss, it would appear that that development of granite into gneiss is taking place not only from the exposed surface downwards, but also in a lateral direction, commencing in and from the open main cleavage fissures of the granite. Hence not only the surface, but also the sides of the main cleavage fissures of a granitic rock would gradually change into that rock of development or exfoliated rock; and that development taking place more rapidly near the surface than in depth, and encroaching as it were upon the granite from its cleavage planes, many portions of that granite that are left yet unchanged would penetrate into that exfoliated rock, representing the appearance of veins; but on the same spots, on lower levels, where the development has not advanced so far, there would be noticed vein-like portions of that exfoliated rock penetrating into the granite. I have observed, for example, in the valley of the Buffalo River, large boulders of granite, which on their upper surface, and in their exfoliating crusts, presented in the minute arrangement of their components distinctly the appearance of gneiss, although the rest was of an unmistakable granitic nature.

The rock gneiss appears to have developed itself chiefly within such basin-like depressions of the general surface of the country, and the degree of its development to depend not only upon the geographical position, but also upon the level on which the respective locality is situated. A peculiar variety occurs on a lower level, for example, of the Buffalo River. It is very imperfectly developed, dense, and close-grained, and could easily be mistaken for granite, and the mountain masses, which are formed by the same rock, are easily recognised, even from a considerable distance, by their step-like appearance, which, especially on their western and occasionally on their eastern side, gives to them the appearance of stairs; and the direction of greatest length of such steps running invariably parallel with the main meridional cleavage fissures of the rock, naturally suggests the idea that their vertical sides are those sides of their vertical cleavage fissures, and their horizontal surface those (lower) sides of the respective horizontal divisional fissures, which were left behind when the portion alongside of the rocks, and respective above them, was removed by denudation; so that we might ascertain the number of horizontal divisional planes of the respective mountains, by merely counting the number of such steps.

That granitic, or proto-gneiss, occurs principally on the lower level to the westward, from the westernmost precipitous edge of Table Mountain sandstone, which marks out the boundary between the higher eastern and lower western portions of the country, and the best known locality where it occurs is at the junction of the Buffalo and Schaap Rivers, around and stretching to the north and south of Wheal Maria. The gneiss of the Springbok district (being situated to the eastward from the Wheal Maria proto-gneiss) is more highly developed, but very coarse-grained, and varying in density according to its position. Comparing it in imagination with gneiss observed in Europe, I could not help thinking that it appeared to be less settled, less perfectly developed, than European gneiss, and certainly the shape of many of its mountain masses remind one more of granite than gneiss. The gneiss of the higher plateau-like basins of Concordia, which is situated close to the large plateau of Bushmanland,† is rather denser and of a finer grain than the Springbok gneiss, and approaches, more especially in the lower country to the west-south-west, more to the nature of proto-gneiss.

JULIUS.

* By the term "basin," I wish to denote a large basin-like depression of the general surface of the country, which, though containing, still, in its general shape, is independent of, the fissures or furrows of valleys, ravines, etc. Such a basin may be traversed by several mountain ridges, may contain several isolated peaks, but its general surface must be concave, falling towards certain points from the higher surrounding country.

† Bushmanland occupies the highest portion in that part of the country, and it might hence afford a good criteron in judging and defining the progress of wear and denudation that is universally observable in the surrounding country.

GEOLOGY—PRIVATE LECTURES ON THE EARTH—No. VI.

ON THE CHANGES THAT BRING TROPICAL REMAINS TO THE NORTHERN HEMISPHERE.

It is well known that there is nothing permanent in Nature—everything is subject to change. The lands and the waters, like the human race, are for ever continually altering their physical aspects, and are never the same from one day to another. In returning to the subject of change of climate, it must be remembered that the sedimentary rocks of the southern hemisphere do not contain organic remains of genera belonging to the tropics, and are, comparatively speaking, of recent origin; whereas those of the northern abound in productions of all climes, besides being compact, and extensively developed. This is a very important fact, and must not be forgotten in a question connected with superficial changes. In reference to the changes the dry lands have undergone, Sir C. Lyell remarks—

"However constant may be the relative proportion of sea and land, we know that there is annually some small variation in their respective geographical positions, and that in every century the land is in some parts raised, and in others depressed in level, and so likewise is the bed of the sea. By these and other ceaseless changes, the configuration of the earth's surface has been remodelled again and again since it was the habitation of organic beings, and the bed of the ocean has been lifted up to the height of some of the loftiest mountains. The imagination is apt to take alarm when called upon to admit the formation of such inequalities in the crust of the earth, after it had once become the habitation of living creatures; but if time be allowed, the operation need not subvert the ordinary repose of Nature, and the result is, in a general view, insignificant, if we consider how slightly the highest mountain chains cause our globe to differ from a perfect sphere. Chimborazo, though it rises to more than 21,000 ft. above the sea would be represented, on a globe of about 6 ft. in diameter, by a grain of sand less than 1-20th of an inch in thickness."

From these observations, we learn that the dry lands have been constantly raised and depressed above and below the sea level, but no motion in a horizontal or lateral direction is suspected to have taken place, with the exception of the allusion to "some small variation" in "geographical position." The mere alteration in the position of continents and configuration of the lands, though affecting to some extent the climates locally, cannot be productive of such a great extreme as that of causing the growth of tropical plants in the north temperate zone, much less in the frigid region or Arctic circle, such as now found entombed in our rocks.

The tropical fossil forests of Melville Island, and those of other lands, now situate within the limits of the Arctic circle, could never have been produced in the latitudes where they are now found; those lands must, therefore, have been exposed in former times to a tropical sun. It has been noticed that the mere variations in the extent of lands and seas will not account for the peculiarity of the northern hemisphere. We have shown that gigantic tree ferns and humming birds are seen in the cold parts of the southern hemisphere, which cannot exist in a corresponding northern temperature; hence, we must not be guided by temperature alone, but by the characteristic productions of the different zones.

If we admit all those mutations of the earth's crust, which have been pointed out by Sir C. Lyell and others, then there can be no *prima facie* objection to the supposition of another movement—namely, a progressive geographical motion northward; more especially if such will in any way explain the otherwise apparent anomalies of geographical phenomena. The same argument that maintains the necessity of the lands having risen and sunk, to account for the occurrence of beds of marine shells on the tops of mountains, equally holds good in maintaining a movement of the land *en masse* northward, to explain the cause of tropical remains being found embedded in the arctic region. If we suppose the lands not only to have become altered in their configuration—rising and sinking above and below the level of the sea—but also, at the same time, to have had an onward motion from the south to the north, we at once become possessed with a key to the whole mystery, and furnished with an explanation that is in strict harmony with the existing course of nature.

We shall, by bringing in such a movement, be able to understand how the fossil remains of such rich tropical vegetation as are found in Greenland, Melville Island, and other places in the north polar regions, once luxuriated on the lands on which they have been deposited, just as readily as we can conjecture where a vessel has come from by the character of her cargo. If England, for example, or the terrestrial film which it occupies, has been gradually moving from the south towards the north, as well as undulating above and below the ocean—as maintained by Mr. Hopkins in his "Connection of Geology and Magnetism"—all the phenomena of the productions of different climates disclosed by geologists will be clearly accounted for, in the exact order in which organic remains are actually found, from the Silurian to the tertiary, as already described in the preceding lectures.

In order to show how admirably this simple theory of a progressive motion northwards accounts for the immense number of animal and vegetable relics that are found embedded in our sedimentary deposits, we will suppose, by way of illustration, a portion of land now in the southern hemisphere—New Zealand, for instance—to be moving slowly from zone to zone in a northerly direction.

This island is at present but superficially covered with sedimentary deposit, the character of which also is very different to that of the rocks of the northern hemisphere, being chiefly composed of sand, gravel, detritus, &c. What would be its geological condition, or its fossiliferous organic contents when it arrived at a latitude corresponding to that of England?

Occupying a position about the middle of the south temperate zone, as New Zealand now does, its present organic productions are necessarily those peculiar to that zone, as already described, consisting principally of arborescent ferns, araucaria, coniferæ, &c., and therefore the character of the deposition, during such time as the land traverses that zone, would be similar to that of the remains found in the carboniferous formations. During the progressive motion, the mutations of the land would be also going on; sometimes its surface would be far beneath the sea level, at others elevated to great heights, thus allowing the ocean to form deposits of mud, sand, gravel, &c., with the remains of plants and animals enclosed therein, and then exposing them to the consolidating effects of time and solar heat. As it moved northwards it would enter the torrid zone, when fresh deposits again would be accumulated, while the organic forms that would be enclosed in them would be like those now abounding between the tropics, and consequently similar to the fossils of the secondary strata; these tropical remains would be deposited on the fossil beds previously formed in the southern hemisphere.

The same thing would continue through the north temperate zone, its organic productions, which have been shown to agree with those of the tertiary epoch, becoming entombed in the accumulating deposits; and thus, when the land had arrived at about 50° north latitude, its sedimentary series of rocks would be identical in all leading characteristics with those of England. During such great changes, various organic forms would necessarily be subject to extinction, from alterations in the physical conditions.

"The contents of the deposition, supposing the land undulated, as it does at present, above and below the level of the sea, during its movement from the south to the north, would represent the order of deposition and organic remains in the exact order they are now found in the rocks of the northern hemisphere—the first sediment enclosing the remains of the southern zone, the second the tropics, and the third the northern hemisphere."—Hopkins on *Geology and Magnetism*, second edition.

CORNWALL AND CARDIGANSHIRE—PRACTICAL MINING.—Although it is easy to prove that Cardiganshire derives a greater relative profit from the capital invested in its mines during the last twenty years than Cornwall, the percentage of interest being considerably greater, yet it must be admitted that the advantages of practical mining are greatly in favour of Cornwall—that is to say that Cornishmen work their mines with much greater spirit than those of Cardiganshire. For example, during the last twenty years, the mines of Cardiganshire, notwithstanding the great profits they have afforded, have not been sunk on an average, 3 fms. a year, while the good dividend mines of Cornwall, such as Wheal Buller and Alfred Consols, have not been sunk less than 10 fathoms a year—that is to say the ore ground of the lodes of Cornwall has been worked three times faster than that of Cardiganshire. So slow has been the progress of the working of mines in Cardiganshire, that although the veins of metal in this district, have been attacked time out of mind, and a tolerably connected history, for the last three hundred years, of the work done, is extant, yet, in no instance have the underground workings reached to a depth of 100 fms. below the main adit. It will be evident to those accustomed to mining questions, that if the engine-shafts had been sunk faster in Cardiganshire, three times as much ore ground would have been ventilated, and laid out in proper sections for working, at the same time that the sales would have been three times greater; and that, inasmuch as many items of cost are not increased by a rapid system of working, the profits of the different companies engaged in this auspicious district would have been doubled or trebled, and that the whole history of its mines would have received a very refreshing impetus. Again, some of the great Cardiganshire mines have been suspended for years in this time—for instance, Cwmystwith, which, in the first 11 years of the last 20, produced a profit of 120,000*l.*, was then suspended, although only 30 fms. under the adit, and after a resumption of work, is now again into dividends of some thousands a year. The Welsh Potosi, which sold 70000*l.* or 80000*l.* worth of silver-lead during the past year, has not yet been drained to the bottom level, which is 30 fms. below adit. Goginan, which made 60,000*l.* profits, the sinking has been suspended at 80 below the deep adit. But notwithstanding these checks, and the slow system of working generally practised in Cardiganshire, a number of established mines have long been paying fully cent. per cent. upon the outlay, and a number of young but advancing mines are making rapid progress towards profits; and the whole mining outlay of Cardiganshire is receiving an interest of 25 per cent., taking one mine with another, and including every mine.—WM. BATTYE.

ATMOSPHERIC INFLUENCES (NEW SERIES).—No. II.

SIR,—In the first paragraph of No. V., of "Private Lectures on the Earth," in No. 1132 of the *Mining Journal* (May 2), appears this remark—"Many theories of the probability of the globe having been originally in a state of igneous fluidity, have been propounded; but this would involve the supposition of similar conditions in both hemispheres, besides necessitating the acceptance of other results, which are totally inconsistent with our experience of the laws of heat:" by which we are to conclude that the scientific world must either abandon the igneous theory of the earth's creation, and adopt terrestrial magnetism, or accept of other results inimical to the present theory of heat; which latter alternative, I think, will be accepted, at no very distant period; since any theory, not having the support of demonstrable evidence, must, with time, succumb to truth; and Mr. Stevens's papers of 1849, and my own of 1851, yet remain unanswered. And if the world should be necessitated to accept other results totally inconsistent with the present experience of the laws of heat, that terrestial magnetism, being based on the present theory, must fall with it.

We are told by Mr. Evan Hopkins, that magnetism and electricity are one and the same, the earth being the emporium; and by sketch he represents it as going in at one pole and flying out at the other. If such, then, be the fact, the atmosphere should decrease in electrical condition with distance from the earth; whereas we know the contrary to be the case; And if the electrical or magnetic current pass through the earth, in the manner represented, how comes it that all the separate parts of the earth have a magnetic north? and, furthermore, if the earth be constantly decomposing at the north, and composing at the south, how does the decomposed matter pass from one pole of the earth to the other?

This fifth lecture is "on the changes that bring tropical remains to the northern hemisphere," and I think it will equally appear that this part of the subject is fatal to "terrestrial magnetism." If there were found in Siberia only the *bones* of the mammoth, then it might be said that these had travelled north with the part of the earth on which the animal died; but there is found there also the flesh, skin, and hair, of animals that never, of their own accord, leave the tropics, many elephants being as entire as when alive; whilst we know that animal matter within the tropics decomposes with great rapidity.

If we direct our attention to the geological composition of the earth, the so-called formation will be no less fatal to "terrestrial magnetism" than the above facts. Coal is a substance compounded by vegetation, and must have been formed when there was not a decomposing influence in the atmosphere; and it has evidently been deposited in layers, and thrown up in its present state by some great convulsion. Coal fields are of the oldest formations, and abound in Australia and Van Diemen's Land, whilst Borneo is a mass of coal; but I suspect that in the north-east of Asia and the north-west of America, much of this material has not been found; although, on the principles of "terrestrial magnetism," it should abound in those localities, in both of which the remains of elephants are found, that animal being, however, extinct in America.

Let us, however, reverse the theory of "heat," and make it the negative instead of positive, or the absence of "cold," and for the sake of argument allow the premises contained in my letter of May 7, what must be the natural consequences? The earth, or belt, round the equator, on being drawn northward by magnetic force, the greatest strain being on the ends, or last-formed portions, must not only be broken in two at the weakest part, the coal bed formation, all the matter being drawn to one point, but would necessarily be compressed, and thrown up into hills, or small mountains. The passage of this mass of matter through the water would cause the water, like a torrent, to flow over the lowest part, carrying with it all loose or detached masses; and, therefore, boulders should be more common all about the north than in India or Africa; the water, on its coming in contact with the "igneous" matter left bare—such as the chasm of the Atlantic—would rapidly be formed into vapour, and pouring down upon the earth, carry with it a vast amount of debris from the high into the low lands; whilst the animals, on the first alarm, would necessarily take refuge in caverns and other places of shelter.

To what extent these conclusions are borne out by facts the geologist can best decide; and he can also inform us whether the projections and indentations on the west coast of Africa, and east coast of America, correspond in their geological formation; and he may also be able to state whether the Pyrenees are of the same age as France and Spain, which they cement together.

To the subversion of this all-important theory of "heat," facts can be adduced by the dozen, whilst I challenge the scientific world to detail one fatal to the doctrine of "cold." Several are given in Mr. Stevens's papers of 1849, on my "Discoveries in Natural Philosophy," and my own of 1851, in addition to which the two following may be adduced:—

If to pounded wet loaf sugar strong sulphuric acid be added, the mixture blackens, increases in volume, and evolves a great amount of heat. It may be said that, in this instance, there is chemical action, which is unquestionably the fact, but that is no reason why the evolution of heat should not be accompanied by contraction. Let us suppose, on the contrary, that electricity is the bond of union in matter, and that heat is the negative state. On the addition of the acid, by some unknown action, the oxygen and hydrogen of the sugar enter into chemical combination, and form water, as is evinced by the deposition of the carbon, and for the combination of these gases a vast amount of electricity is necessary; the mixture, therefor., being thrown into the negative state becomes "heated," and swells by the separation of the particles of the compound from the loss of electricity to supply the chemical action. On quick lime being wetted, after a short time, increase of volume and evolution of heat occur. In this case there is no chemical action beyond the combination of the lime and water, to supply the electricity for which both the lime and a portion of the water are robbed of theirs, and there is, therefore, disintegration and evolution of steam, indicating a negative condition, or want of electricity, in the mass; "cold," then, is positive—"heat" negative, and this is the rock on which Mr. Hopkins has foundered. His mind being poisoned with the theory of heat, and, as a distinguished practical geological engineer, reasoning on matter as it is, and that matter having been compounded, or finally arranged under magnetic influence, naturally brought him to the conclusion that magnetism was the cause instead of the effect; but I think that further reflection will satisfy him that the theory of heat is not to be maintained.

FRANKLIN COXWORTHY,
Ligneries St. Brieuc, Cotes du Nord. Author of *Electrical Condition.*

LITERARY NOTICE.

Look to your Provisional Specifications, a Word of Caution to Inventors: by WILLIAM SPENCE, Assoc. Inst. C.E., &c. Weale, 59, High Holborn.

Whatever proceeds from the pen of Mr. Spence is always worthy of careful perusal, and in this instance he has taken up a subject that few like to say much upon, since it is one where there is no opportunity of resorting to the dicta of the judges, there being as yet no law cases in which the legal sufficiency of the provisional specification has been in question. As, however, every one considers "Prevention better than cure," Mr. Spence must be considered as a good friend to the patentee by coming forward with remarks upon a matter, which is without doubt of the highest import nce to the inventor and patentee. There can be no doubt that very few inventors really understand what is meant by "provisional specification;" some think fit to designate an account of the supposed merits of a new scheme by this name, and others bestow this title on a statement of particulars which would apply equally well to fifty other inventions already patented; or being at a loss how to understand the term, pursue a course which, although it may possibly lead to less fatal effects, is of an unskilful character—that of giving the full particulars of both the nature of the invention and the manner of performing the same. And these loose views of the subject are to some extent fostered by some of the Government officials, who take some pains to imbue inventors with the idea that they have only to write out a statement in their own way and go to a law stationer and get the proper forms filled up in a clerkly manner. Now Mr. Spence endeavours, and we think successfully, to show that the invention must be identifiable by the terms of the provisional specification, and he very pertinently says (p. 13) "I am ready to admit that the final specification may contain many points of detail not expressly referred to in the provisional specification, and that it may claim the invention either expressly (in the form of a distinct claim) or impliedly (as resulting from the statements in the whole document) in terms different from those contained in the provisional specification;" and afterwards adds (p. 14) "But the invention must according to law be the same in both documents, hence any enlargement (however great an improvement) appearing in the final specification, as either an express or an implied claim which interferes with this required identity, will convict the specification of fatal insufficiency and invalidate the patent." There is no doubt that the provisional specification should in reality be a statement (though not perhaps one of complete legal exactitude) of what is claimed as the patented invention, and intending patentees cannot do better than get this sixpenny pamphlet, which will convince them that this document should be submitted to a competent adviser ere it is placed amongst the patent records.

PROTECTING IRON FROM OXIDATION.—Mr. A. Reid, Sidmouth-street, Regent-square, places the iron to be operated upon in a properly constructed furnace, and completely covers its surface with soot, or other matters composed of the same elements and having similar properties; the temperature is then raised to a red or white heat, and continued for fifteen or thirty minutes, or longer, according to the mass of iron to be operated upon; it is then removed from the furnace and allowed to cool; the surface is then thoroughly cleaned, and is found covered with a coating which is impervious to rust under ordinary circumstances.

THE WILTS AND GLOUCESTER AGRICULTURAL DISTILLERY COMPANY (LIMITED).

Capital £11,000, in 5500 shares of £2 per share.—Deposit £1 per share.
The remaining capital to be called for and paid by two equal instalments, on the 1st of August, and the 29th day of September next.

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WILLIAM KEENE, Esq., Minety House, Minety.
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CHARLES LARGE, Esq., Leigh Hall, Cricklade.
Mr. RICHARD MAYNARD, Taunton, Somerset.

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HENRY HIBBERD, Esq. | W. S. PERRY KEENE, Esq.

SECRETARY (pro tem.)—William Dommett, Esq., Chard, Somerset, and Minety, Malmesbury.

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Wilts and Dorset Banking Company, Malmesbury.
London and County Bank, Lombard-street, London.

SOLICITORS—Messrs. Dommett and Canning, Chard, Somerset.

AUDITORS—To be appointed by shareholders.

OFFICES,—ON THE WORKS, MINETY, MALMESBURY.

BROKER—W. Lemon Oliver, 4, Austinfriars, London, E.C.

PROSPECTUS.

This company is established for the purpose of distilling spirits from beet root and mangold wurtzel, upon the principle of a discovery by Mons. Leplay, and for which a patent has been obtained.

In order to ensure the efficient working of the patent in this district the company has secured (by purchase) 76 acres of freehold land peculiarly calculated for the growth of beet and mangold, on which the works and distilleries are to be erected. The estate so purchased is situate about half a mile from the Minety station on the Swindon and Gloucester Railway, in a district where beet and mangold of the best quality may be grown to any extent.

The patent for distillation has been introduced into England by Messrs. Wm. Dray and Co., the celebrated agricultural implement makers; and in their prospectus introducing the subject to the public, they state their willingness to take shares in each of the companies to be established, having fully satisfied themselves of the large profits to arise therefrom.

Under the present revenue law, distillation from mangold and beet root is prohibited; but the English Government feeling the importance and advantages to be derived by the agricultural interest of England, have granted to Messrs. Dray twelve licenses for working the patent in this country; one of such licenses has been secured for this district, and will probably lead to immense results as the business of the company increases.

The estimated capital of the company being £11,000, the directors, for the satisfaction of the public, after careful enquiry and consideration, put forth the following statement as to the appropriation of the above sum:—

Purchase of land (76 acres, freehold), erection of a 20 ton distillery, with steam engine, and all necessary buildings, and complete plant for rectifying the spirits	£6,900 0 0
First purchase of 2300 tons of mangold and beet, sulphuric acid, yeast, coals for steam engines, &c.	2,700 0 0
Total	£9,600 0 0
Leaving a surplus of £1400 for purchase of horses, casks, erection of sheds for cattle, water tanks, incidental expenses, first year's wages, salaries, &c. &c.	1,400 0 0
Total	£11,000 0 0

The following estimated revenue, after the most searching investigation, drawn from the statistics of Messrs. Dray and Co., who have practically proved the same, and which have been theoretically tested by Dr. Letheby and Professor Mitchell, F.C.S., is as under. The latter gentleman, in a letter dated 5th March, 1857, addressed to Messrs. Dray and Co., writes:—"In conclusion, I may state, that I think the process you have introduced into this country of obtaining spirits from saccharine roots, and the subsequent employment of the residues (pulp) for feeding cattle, is one of the happiest inventions of late years, and is calculated to be the cause of a great increase in the prosperity of the agriculture of this country; for not only is a valuable substance (alcohol) obtained from a root or series of roots not hitherto employed in this kingdom for that purpose, but the residue of the preparation of that alcohol is a much more valuable article of food than the original roots from which it was produced, or in other words, 66 lbs. of the residue (pulp) has the same nutritive value as 100 lbs. of the fresh root, so far as the formation of flesh is concerned.

RECEIPTS.

Produce of 3000 tons of beet and mangold, at 16 gallons per ton= 48,000 gallons. Price is 3s. 3d.—estimated at 2s. 6d. per gallon	£6,000 0 0
1500 tons residue, for feeding cattle, 10s. per ton	750 0 0
Total	£6,750 0 0

EXPENDITURE.

Purchase of 2300 tons of beet	£2,300 0 0
Wages, salaries, &c.	500 0 0
Coals, 200 tons	200 0 0
Yeast and sulphuric acid	75 0 0
Wear and tear of machinery, oils, grease and incidentals, at most say	325 0 0
Royalty of 1d. per gallon on 48,000 gallons	200 0 0
Total	£3,600 0 0
Balance to profit (equal to 45 per cent.) on revenue, or 30 per cent. on capital	£3,150 0 0
Total	£6,750 0 0

If to this be added 9d. per gallon (the present and usual selling price of the spirit being 3s. 3d. a gallon), the profits would appear to be about 50 per cent. per annum on the capital.

It will be seen that these calculations are made upon the assumption that all the mangold and beet is bought at £1 per ton, except that which is to be raised on the estate. In the present year the company may fairly calculate on 700 tons of mangold from the quantity of land sown, and in future years 30 acres may be estimated to be annually cropped for consumption, whilst the other parts of the farm not so cropped will, in rotation, yield other agricultural produce, but of which no account is taken in the estimate.

The payments, for safety, are all calculated on the highest scale, and in practice will no doubt be found to be much less than estimated, whilst the value of the spirits is taken at the lowest price, the present value being 3s. 3d. per gallon.

The great advantage arising from M. Leplay's patent is, that the residues of the beet or mangold after distillation remain uninjured as food for cattle. In the process of distillation the roots lose about 40 per cent. in weight, so that out of the 3000 tons calculated upon, 1500 tons of residues, at least, will be left as food for cattle, and this it is proposed to sell at the very low figure of 10s. per ton, a preference in the sale being given to shareholders and those who supply the beet or mangold to the company. As some doubts may be raised in the minds of parties who have not given the subject consideration, the following opinion of Professor Wilson, Mr. Robert Kane, and M. Blanchett, cited in Dr. Turners *Elements of Chemistry*, will tend to remove any difficulty on that head:—The sugar (which is transformed into alcohol) of beet is a subject which contains no nitrogen, and, when pure, no inorganic matter. It is formed during the growth of the plant by the mere concurrence of air and water. And the other materials of the beet root which remain behind after the sugar (or alcohol) is extracted contain the nitrogen and salts, which render beet useful as food or available as manure when returned to the soil. Hence the waste pulp is greedily purchased by the farmers for feeding."

Messrs. Dray have established such a distillery at Farningham, in Kent, and have proved the value of the residues after distillation by fattening and feeding a large number of beasts and sheep thereon, and during the lambing season they fed 200 ewes principally on the residues; it has also been found to be exceedingly valuable for feeding milch cows. There is every reason to believe that the establishment of such a distillery will be of immense advantage to the two counties of Wilts and Gloucester, and that the agriculturalists supplying the beet and mangold will readily take the residues for feeding. The company, however, will always keep some cattle to feed on the residues.

Although calculated at the commencement for the distillation of 3000 tons of beet, a much larger quality may be distilled by the same apparatus; the time occupied in the distillation of 3000 tons being 150 days only. It has been found in practice that good beet and mangold produce above 18 gallons of proof spirit to the ton; in the calculations here made the estimate has been taken at 16 gallons to the ton only. As to the means of disposing of the produce—the spirit being plain or neutral when rectified, ranking after grape spirit in value and quality, it is fitted to any use to which pure spirit of wine can be applied. It is used for many purposes where grain spirit is not in favour, such as perfumery, &c. Many thousands of gallons of beet root spirits, paying duty of 15s. per gallon as foreign spirits, are imported from Belgium annually for the use of perfumers and aromatic spirit makers. This spirit is also employed in the fabrication of brandy in the north of France—two millions sterling in value were employed in this manner last year in France alone.

It is also employed for the Arts—for all kinds of chemicals, varnishes, French polishes, tinctures, &c.

Immediate application for shares should be made to the Secretary, Chard, or Minety, near Malmesbury; or to W. LEMON OLIVER, Esq., stock and share broker, 4, Austinfriars, London, E.C.

FORM OF APPLICATION FOR SHARES.

To the Directors of the Wilts and Gloucestershire Agricultural Distillery Company (Limited), Minety, Malmesbury.

GENTLEMEN,—I request that you will allot me shares of £2 sterling each in the above company, and I agree to accept such shares or any less number that may be allotted to me, and to pay the deposit of £1 per share on allotment, and the two instalments of ten shillings per share on the 1st day of August and 29th day of September next, and to execute the Articles of Settlement of the company.

Dated the day of , 1857. Name .....
Address .....
Occupation 134

THE BEST HYDRAULIC CEMENTS,

PORTLAND, ROMAN, AND BATH;
Made from the NATURAL CEMENT STONE, by the ORIGINAL INVENTORS AND MANUFACTURERS,

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Can be relied upon for INVARIABLE REGULARITY of strength and colour.

PRICES.—Casks included, delivered (freight paid) at Cardiff, Newport, and most other ports in South Wales:—

Portland and Bath, per cask of 4 bushels ..... 8s. 6d.
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And delivered to all other parts at proportional prices.

Reference permitted to Mr. D. LLEWELLYN, C.E., Consulting Mining Engineer, 10A, King's Arms-yard, Moorgate-street, London, of whom samples, testimonials, and all further information may be obtained. 135

NEW PATENT ACT, 1852.—Mr. CAMPIN, having advocated

Patent Law Reform before the Government and Legislature, and in the pages of the *Mining Journal*, &c., is now READY to ADVISE and ASSIST INVENTORS in OBTAINING PATENTS, &c., under the NEW ACT.

The Circular of Information, gratis, on application to the Patent Office and Designs' Registry, 166, Strand. 136

PATENT WIRE ROPES, ONE-HALF THE COST OF HEMP ROPES.—HENRY J. MORTON AND CO.'S (No. 2, BASINGHALL BUILDINGS, LEEDS) PATENT WIRE ROPES, for the use of MINES, COLLIERIES, RAILWAYS, &c.; one-half the weight of hemp rope, and one-third the cost; one-third the weight of chains, and one-half the cost—in all deep mines these advantages are self-evident. References to most of the principal colliery owners in the kingdom.

GALVANISED SIGNAL CORDS AND KNOCKER LINES; will not rust or corrode, and not affected by the copper water in mines. Very strong, and not at all liable to break. Prices from 15s. per 100 yards.

CROGGON'S PATENT ASPHALTED ROOFING FELTS, 1d. per foot.
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FAIRBANK'S WEIGHING MACHINES, of all sizes.
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PATENT FLEXIBLE STEAM PACKING, 1s. 4½d. per lb.
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PATENT AMERICAN DRIVING BANDS, much cheaper and more durable than leather.
FLAX HOSE PIPES, for water, &c.
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N.B. Illustrated price list on application. 137

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especially prepared to meet the requirements of the new Act for the Inspection of Coal Mines. It has met with the decided approval of many large colliery owners and managers. SIMPLE, EFFICIENT, and CHEAP. Price £1 10s. each.

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Price £3 3s. to £4 4s. each.
STEAM PRESSURE GAUGES, very strong and accurate, £2 and £2 12s. 6d. each.
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MACHINES of all sizes, from 1 cwt. to 30 tons, for RAILWAY WAGONS, CARTS, or WAGONS.—For prices and all other information, apply to HENRY J. MORTON and Co., Galvanised Ironworks, 2, Basinghall-buildings, Leeds.
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PATENT COMBINED GAS WORKS, of all sizes, for the use of PRIVATE HOUSES, MANSIONS, RAILWAY STATIONS, MILLS, COLLIERIES, VILLAGES, &c., FIXED COMPLETE, with greatly improved means for purifying, &c. Works of all sizes, from 10 lights to 500 lights, estimated for. The construction is so simple, that the works can be entrusted to the management of an ordinary labourer or servant.
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TO ENGINEERS, RAILWAY COMPANIES, STEAM PACKET COMPANIES, COLLIERY OWNERS, MILL OWNERS, &c:—WARNE'S IMPROVED ANGLO-AMERICAN FLEXIBLE CANVAS, and MINERALISED INDIA RUBBER PACKING for STEAM JOINTS, PUMP CLACKS, VALVES, &c.—The attention of all using steam-power is called to this elastic packing, possessing advantages which renders it the cheapest in use. Reducing friction, saving time and labour, and lasting as many months as hemp or spun yarn will weeks. Price 1s. 4½d. per pound, carriage paid.
Also, MINERALISED INDIA RUBBER HOSE PIPES, TUBINGS, MILL BANDS, and WASHERS. The attention of engineers, mill owners, machine makers, brewers, and others, is called to the above improved hose pipes and machine belting or mill bands, the important advantages of which, as regards durability, efficiency, and cheapness, are too well known and appreciated to need comment.
For lists of prices, apply to the agents, HENRY J. MORTON and Co., Galvanised Ironworks, 2, Basinghall-buildings, Leeds. 141
INDIA RUBBER WASHERS for JOINTS for steam, water, and gas, of all sizes.

GUTTA PERCHA BANDS, TUBING, &c.—Our BANDS, carefully MANUFACTURED from the VERY BEST GUTTA PERCHA only, are considerably CHEAPER, and, when fairly worked, are far more DURABLE than LEATHER. Can be had in lengths of 100 or 120 ft. without a joint, are easily joined or repaired, and are, when worn out, re-purchased by us at about one-third of their original cost. In the event of a break down, a band of any size can be supplied within a few hours of receipt of order. The present prices are as under:—
Bands ⅛ in. thick and upwards to ½ in. ... 2s. 6d. per lb.
Bands above ½ in. thick ... 2s. 2d. per lb.
Subject to a liberal discount for cash, varying according to quantity. TUBING and other articles equally low. All our patented manufactures are to be obtained wholesale from our own works; retail from any of our dealers.
THE WEST HAM GUTTA PERCHA COMPANY,
West-street, Smithfield, London, E.C. 142

SLATE SLABS AND ROOFING SLATES.—The PROPRIETORS of the NEW MACHNO SLATE and SLAB COMPANY (LIMITED) have, at great cost, made arrangements to convey their produce from their quarries near Ffestiniog to Conway, to obtain the great advantage of access to the railway, giving them the facility of executing orders without the slightest delay. They trust that making Conway their shipping port will not cause them to be confounded with those hitherto known as the CONWAY SLATES, as the MACHNO SLATES are ENTIRELY FREE from PYRITES, or any metallic substance liable to OXIDATION; and, from having been tested in Wales for at least half-a-century, are found to attain a degree of hardness, by exposure to the atmosphere, unknown in any other vein. The MACHNO SLABS are too well known to need comment, but the annexed valuable testimonial from Mr. Magnus, and also a strong chemical test to which they have been subjected, will better explain their quality:—

Pimlico Slate Works, Upper Belgrave-place, London, April 7, 1855.—GENTLEMEN: I very readily offer my testimony to the excellence of your slabs raised at the Machno Quarries. I prefer them to all others obtained in North Wales, with one exception, and that is much of the same quality as the Machno. The slabs can be obtained of large sizes, and of every requisite thickness. They are homogeneous in texture, strong, of good colour, free from spots and other impurities, pleasant to the tool of the mason, easily planed and moulded, and will bear exposure to a much higher degree of heat than slabs from any of the Carnarvonshire quarries.
Signed, G. E. MAGNUS.

To the Proprietors of the Machno Slate and Slab Quarries.

Liverpool, Oct. 18, 1855.—DEAR SIR: The experiments which I have tried on the specimen of slate, in reference to its capability of resistance to acids, enable me to pronounce it in every way capable of retaining boiling vinegar, without injury either to its own substance, or to the contained vinegar. A piece of the slate, weighing 95 grs., was exposed for 26 hours to the action of cold strong nitric acid; it was then boiled in the same acid for 20 minutes, and when washed, dried, and weighed, was found not to have lost perceptibly in weight. This I consider the most conclusive experiment. Signed, GEO. C. HUSON.
Wm. Orme Carter, Esq., Machno Slate and Slab Company. 143

All communications must be addressed to the resident director, Mr. T. H. WHEELER, Conway, North Wales.

INVESTMENTS IN BRITISH MINES.
Full particulars of the most important Dividend and Progressive Mines will be found in the Fourth Edition of

BRITISH MINES CONSIDERED AS AN INVESTMENT,
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SOUTH LADY BERTHA COPPER MINING COMPANY.
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BANKERS—Messrs. Barclay, Bevan, and Co., London; the Devon and Cornwall Banking Company, Tavistock.
PURSER—Mr. M. W. Bawden, Liskeard. | SECRETARY—B. G. Eyton, Esq.
MANAGING AGENT—Captain William Goss.
OFFICES,—32, BUCKLERSBURY.

The lease of this valuable property has been secured by the present proprietors, after a long contest and considerable cost, for a term of 21 years, at 1-15th dues. It is situate in the parish of Buckland, Devon, adjoining to, and parallel with, Lady Bertha, and surrounded by the productive mines of this celebrated district.
There are three lodes running through the entire length of the sett, intersected by cross-courses, and embedded in a highly metalliferous clay-slate.
An engine-shaft is sunk to the 40 fm. level, and a large quantity of rich copper ore opened. An adit level is driven on the course of a fine lode, which is yielding copper ore worth £15 per ton. It is intended to erect a water-wheel and crusher forthwith, there being ample power for effectually developing this mineral property, which is known to contain large deposits of copper ore.
The statements of the agent will indicate with sufficient clearness the great probability of success, taking into consideration the amount of work done, which has cost £5000; all of this is available for the present company. The recommendations contained in the following reports will be carried into effect, so that immediate returns may be anticipated.
The mine is free from debt, and with an available balance in hand for the first three months, it being a fundamental rule that every account shall be paid monthly, to avoid individual responsibility.
The committee have great pleasure in referring to the annexed reports; and any further information may be had by applying at the office of the company.

South Lady Bertha, Horrabridge, June 1, 1857.—This mine is situate in the parish of Buckland, Devon, about 3½ miles from the town of Tavistock, on the banks of the River Tavy, one of the largest tributaries from the Dartmouth hills to the navigable River Tamar. South Lady Bertha is bounded on the north by Tavy Consols, North Tavy, Virtuous Lady, Bedford, and Lady Bertha. To the north of east are Sortridge Consols and North Wheal Robert, all productive mines. In Tavy Consols £24,000 worth of copper ore has been realised; this mine is now sampling from 110 to 120 tons every two months. At the Virtuous lady Mine over £100,000 worth of copper ore has been sold from above the 15 fm. level. This fact will convince the most sceptical of the immense returns from the large deposits of this particular district. In addition to which, under my own management in Lady Bertha Mine, which I commenced in September, 1855, to January, 1857, being 17 months, we sold £3628 worth of copper ore. This mine presents every chance of a successful result. South Lady Bertha lodes are parallel and within 200 fms. of the present working in Lady Bertha. Three lodes have already been opened upon, and several hundreds of pounds' worth of copper ore sold. A perpendicular shaft is sunk to a depth of 40 fms., the lode cut, and presenting every chance of producing a large deposit of ore. This work was effected by the Plymouth and Dartmouth Mining Company, who failed in completing their extensive operations in the county, in consequence of which the lease of this mine reverted into the hands of the late Sir Ralph Lopes, who during his life time refused to grant to other parties. The present Sir Massey Lopes being desirous of having his mineral property wrought, has granted the Lady Bertha and the South Lady Bertha Mines upon liberal terms. The latter mine is principally woodland, therefore no surface damage is chargeable, this being a considerable item in mining. There is an abundant supply of water-power for pumping, drawing, crushing, and other purposes. The lodes opened upon are large, composed of gossan, quartz, and copper ore; in fact, the character of the lodes and strata is all that can be desired for the production of immense deposits of copper ore, and upon completing the water-wheel, &c., South Lady Bertha will at once take a prominent position in the sales of copper ore, it being of a rich quality, averaging from £12 to £15 per ton. A good pile is now on surface from the last month's working. For the information of those interested in this valuable property, wishing to know its geological features, it is one of the group of mines situate in the highly metalliferous basin of the east of Cornwall and west of Devon—namely, East and Lady Bertha, Tavy Consols, Virtuous Lady, and South Lady Bertha, all joining each other, and near to and surrounded by the Devon Great Consols, Bedford United, Devon and Cornwall, Gawton, Hingston, North Robert, Sortridge Consols, Wheal Arthur, Edward, and Friendship, the returns from which are enormous, and too well known to require any comment from me; I shall, therefore, confine myself to the principal features of South Lady Bertha, the situation of which is good, the granite range being to the north, and the limestone range of Plymouth to the south. At surface it is covered with patches of quartz rocks, which extend for 1½ mile east and west, and about 1 mile from north to south. These rocks are from 1 ton to 1000 tons weight, in the fissures of which are quantities of sulphurous mundic and iron. At the Virtuous Lady Mine, not more than 12 ft. below the surface, and directly under one of these masses of rock, about 1000 tons of copper ore have been raised. The same result occurred at Lady Bertha; these rocks forming a crust to the mineral deposits below, and wherever the lodes pass beneath or near, large quanties of copper ore have always been found. Every one practically acquainted with mining knows that a change of ground generally produces a change of results in metalliferous deposits—either riches or poverty. The stratification of the South Lady Bertha is highly mineralised, and all that can be desired. I feel more sanguine than otherwise I should do that the success of South Lady Bertha Mine must be attended with greater results than generally emanate from mining property, and would strongly recommend it to any of your friends to take an interest in this valuable property. WM. GOSS.

South Lady Bertha, Horrabridge, June 2.—At your request, I have carefully inspected this property, which is situated in the parish of Buckland Monachorum, it being about 200 fathoms south of Lady Bertha and Tavy Consols Mines, its western boundary being the river Tavy, from which an abundant supply of water for machinery, and all other purposes, could be obtained. The former workers sunk a shaft to the depth of 40 fms. near the western boundary, and I have been credibly informed that in the 40 fm. level east the lode is from 3 to 4 ft. wide, orey throughout, but the former company could not work the mine to advantage, in consequence of being deprived of the water from the Tavy, only being supplied a part of the year from a brook, which was not sufficient to keep the mine drained in a dry season. The shaft is sunk on the north lode, and opened at the surface eastward at different points, from which some very pretty stuff has been raised, now lying at the surface—mundic and good stones of ore. To the south of this about 50 fms. there is another lode underlying in the same direction—viz., north. The back of this lode also produces a strong mundic, spotted with ore. Lady Bertha main cross-course traverses this ground, against which I am of opinion that the lode will be found very productive of copper ore. Taking this ground on all its bearings, I consider it deserves a spirited trial, which can be done at a moderate outlay, as water machinery only will be required. JOHN LEAN. 145

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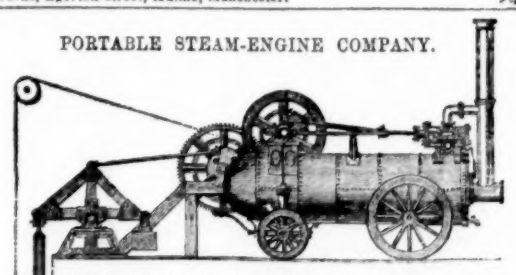

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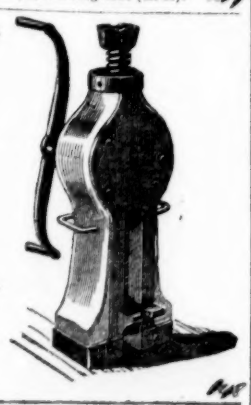

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Messrs. KNOWLES and BUXTON are prepared to SUPPLY hot-blast furnace tuyeres with sockets, at 36s. each; without sockets, at 35s. each; smiths' forge tuyeres, at 15s. each; delivered at Chesterfield Station. 148

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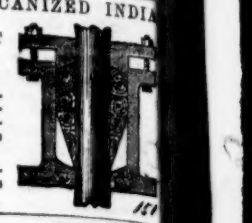

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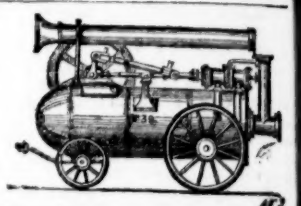

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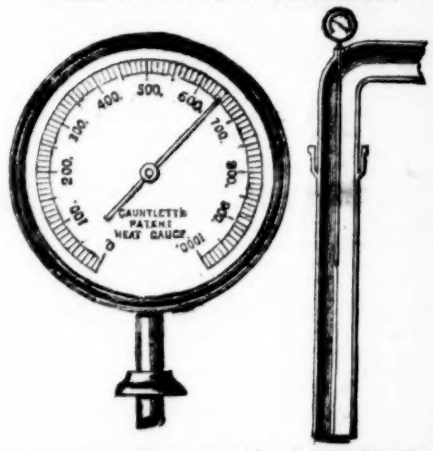

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Its ADVANTAGE consists in its capability of INDICATING HIGH TEMPERATURES beyond the reach of the ordinary mercurial thermometer. Its extreme sensitiveness, and the precision with which it registers high temperatures, renders it invaluable as an appendage to the heating stoves of blast furnaces. The fireman, if guided by its indications, is enabled to MAINTAIN a UNIFORM TEMPERATURE in the stove (an important matter in blast furnace operations), whereby a considerable saving of fuel may be effected, both in that used to heat the stove, as well as that which is consumed in the furnaces to smelt the minerals. These gauges are supplied only by W. J. LEDWARD, Middlesbrough-on-Tees. 154

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